

REMARKS

This paper is submitted as a supplemental amendment to the Response to Final Office Action Mailed October 19, 2006. Claims 1-4, 8-10, and 12 have been canceled without prejudice or disclaimer as to the subject matter recited therein. Claims 13-20 and 25-32 remain pending in the case. The arguments presented in the previous Response are reiterated as to the remaining pending claims for the convenience of the Examiner.

Section 102 Rejection

Claims 1-4, 8-10, and 12 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent Application No. 2003/0235983 to Li et al. (hereinafter referred to as “Li”) in view of U.S. Patent No. 5,741,362 to Kobayashi (hereinafter “Kobayashi”). Claims 1-4, 8-10, and 12 have been canceled rendering rejection thereto moot.

Claims 13-20, 25, and 26 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Li and Kobayashi in view of U.S. Patent No. 5,636,762 to Juhola et al. (hereinafter “Juhola”). Claims 27-31 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Li and Kobayashi in view of U.S. Patent No. 5,830,805 to Shacham-Diamand et al. (hereinafter “Shacham-Diamand”). Claim 32 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Li, Kobayashi, Shacham-Diamand and Juhola. To establish a case of *prima facie* obviousness of a claimed invention, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. Second, there must be a reasonable expectation of success. As stated in MPEP 2143.01, the fact that references can be hypothetically combined or modified is not sufficient to establish a *prima facie* case of obviousness. See *In re Mills*, 916 F.2d. 680 (Fed. Cir. 1990). Finally, the prior art references must teach or suggest all the claim limitations. *In re Royka*, 490 F.2d. 981 (CCPA 1974); MPEP 2143.03 (emphasis added). Specifically, “all words in a claim must be considered when judging the patentability of that claim against the prior art.” *In re Wilson* 424 F.2d. 1382 (CCPA 1970). Using these standards, Applicants contend that the cited art fails to provide teaching or suggestion for all features of the

currently pending claims, and furthermore, cannot be combined or modified to do so. Several distinctive features of the present invention are set forth in more detail below.

Li, Kobayashi and Juhola cannot be combined to provide teaching or suggestion for a system comprising: (i) a chamber, (ii) a plurality of tanks, and (iii) a plurality of volume sensors positioned within the plurality of tanks, such that the chamber and the plurality of tanks are characterized into at least three different zones based upon adaptations of the volume sensors to maintain different volumes of a process fluid in the respective zones.

Independent claim 13 recites in part:

A system, comprising: a chamber configured to process one or more wafers for the fabrication of microelectronic devices; a plurality of tanks serially coupled to the chamber and adapted to store a process fluid used to treat the wafers ... and a plurality of volume sensors positioned within the plurality of tanks such that the chamber and the plurality of tanks are further characterized into the at least three different zones based upon adaptations of the volume sensors to maintain different volumes of the process fluid in the respective zones.

As described in more detail below, Li, Kobayashi, and Juhola each fail to teach or suggest, and cannot be combined or modified to teach or suggest, all limitations of present claim 13. As a consequence, the § 103 rejection of independent claim 13 and all claims dependent therefrom is respectfully traversed.

Li discloses an electroless plating system including a processing chamber (plating chamber 120) and a plurality of tanks (pre-heat tank 110 and holding tank 100) in the embodiment of Fig. 1. However, Li fails to provide teaching, suggestion or motivation for a “plurality of volume sensors,” as presently claimed. Teaching, suggestion or motivation for the presently claimed “plurality of volume sensors” is also lacking with Kobayashi.

The Examiner appears to agree that teaching or suggestion for the claimed “plurality of volume sensors” cannot be found within Li. On page 6 of the Office Action, the Examiner admits that “Li clearly does not disclose a plurality of volume sensors.” However, the Examiner suggests that “Juhola discloses that it is known to use volume (or level) sensor[s] in the tanks (items 98-101)

in order to maintain proper volumes of the process fluid” (Office Action, page 6). Therefore, the Examiner concludes that it would have been obvious to combine the volume level sensors of Juhola with the electroless plating system of Li “to allow for appropriate volumes in the tanks.” The Applicant disagrees with the proposed combination, for at least the reasons set forth below.

The level sensors disclosed by Juhola are not equivalent to the presently claimed “plurality of volume sensors.” As noted above, claim 13 requires that a plurality of volume sensors be positioned within a plurality of tanks, such that the chamber and the plurality of tanks are characterized into at least three different zones based upon adaptations of the volume sensors to maintain different volumes of the process fluid in the respective zones.

In column 4, Juhola teaches that a plurality of sensors (98-101) may be externally mounted to a sidewall of reservoir 40 to monitor the level of the process fluid contained therein. For example, and as shown in Fig. 2, “[h]igh and low liquid level sensors 98 and 99 are positioned on the sidewall 84... [to] provide signals indicative of whether the liquid level within the reservoir exceeds a full level or is less than a low level” (Juhola -- col. 4, lines 11-14). Juhola suggests that sensors 100 and 101 may be included to “enhance safety and prevent contamination by ensuring that the reservoir does not become either overfilled or completely empty.” For example, “if the high liquid-level sensor 98 were to become inoperative the HI-HI sensor 100 would provide a signal in the event that the liquid within the reservoir 40 were to rise to the level thereof. In this way filling of the reservoir 40 would be suspended... to prevent liquid from entering a gas withdrawal conduit 102” (Juhola -- col. 4, lines 19-27). On the other hand, “the LO-LO sensor 101 is intended to signal when the reservoir 40 has become nearly empty in the case of failure of the low liquid-level sensor 99. In this way the LO-LO sensor 101 serves to prevent air or gas from being introduced into the pump feed line 92” (Juhola -- col. 4, lines 27-32).

The teachings of Juhola differ from the claimed limitations in several ways. For example, Juhola explicitly teaches that the level sensors (98-101) are externally mounted to a sidewall (84) of a single reservoir (40). This is non-analogous to the claimed plurality of volume sensors, which are positioned within a plurality of tanks/reservoirs. Because Juhola fails to provide teaching or suggestion for a plurality of reservoirs or a plurality of level sensors (98-101) positioned as claimed,

the level sensors disclosed by Juhola cannot be used to characterize a chamber and a plurality of tanks into at least three different zones, based upon adaptations of the level sensors, to maintain different volumes of the process fluid in the respective zones. In other words, the level sensors disclosed by Juhola do not read upon, and cannot be considered equivalent to, the presently claimed “plurality of volume sensors.”

Juhola cannot be combined with Li and Kobayashi to overcome the deficiencies therein. As noted above, Li and Kobayashi fail to provide teaching, suggestion or motivation for one volume sensor, much less a “plurality of volume sensors,” as presently claimed. The Examiner suggests that the level sensors of Juhola can be incorporated within the electroless plating system of Li. This is an incorrect assumption.

First of all, Li lacks the necessary motivation that would enable one skilled in the art to modify the teachings of Li to include a plurality of volume sensors, as claimed. For example, Li fails to provide teaching, suggestion or desirability for monitoring a volume of the processing fluids within processing chamber 120, pre-heat tank 110 and holding tank 100. Similarly, Juhola lacks the necessary motivation that would enable one skilled in the art to divide the plurality of level sensors (98-101) disclosed by Juhola amongst a plurality of reservoirs, such as the processing chamber 120, pre-heat tank 110 and holding tank 100 included within the system of Li. As noted above, the level sensors disclosed by Juhola are used to provide signals indicating whether or not the liquid level within a single reservoir exceeds a high level (sensor 98) or a high-high level (sensor 100), or alternatively, falls below a low level (sensor 99) or a low-low level (sensor 101). Dividing the plurality of level sensors among a plurality of reservoirs would prevent Juhola from determining if the liquid level within the reservoir exceeds the high levels or falls below the low levels described above. In other words, dividing the plurality of level sensors (e.g., sensors 98-101 of Juhola) amongst a plurality of reservoirs (e.g., reservoirs 120, 110 and 100 of Li) would render the invention of Juhola unsatisfactory for its intended purpose.

For at least the reasons set forth above, Li, Kobayashi, and Juhola each fail to provide teaching or suggestion for all limitations of present independent claim 13. In addition, the teachings of the cited art lack the necessary motivation that would enable one skilled in the art to combine their respective teachings.

Li, Kobayashi and Shacham-Diamand cannot be combined to provide teaching or suggestion for a system having an intermediate tank interposed between a chamber and a storage tank and further having a (third) set of pipes configured to transport a process fluid from the chamber directly to the intermediate tank. Independent claim 27 recites in part:

A system, comprising: a chamber configured to process one or more wafers for the fabrication of microelectronic devices ... a storage tank configured to hold the process fluid; an intermediate tank interposed between the chamber and the storage tank ... and a third set of pipes configured to transport the process fluid from the chamber directly to the intermediate tank.

As described in more detail below, Li, Kobayashi and Shacham-Diamand each fail to teach or suggest, and cannot be combined or modified to teach or suggest, all limitations of present claim 27. As a consequence, the § 103 rejection of independent claim 27 and all claims dependent therefrom is respectfully traversed.

Li discloses an electroless plating system including a processing chamber (plating chamber 120), a storage tank (holding tank 100) configured to hold the process fluid, and an intermediate tank (pre-heat tank 110) interposed between the chamber and the storage tank (See, e.g., Fig. 1 of Li and corresponding text). However, Li fails to provide teaching, suggestion or motivation for “a third set of pipes configured to transport the process fluid from the chamber directly to the intermediate tank,” as recited in present claim 27. Teaching, suggestion or motivation for the presently claimed “third set of pipes” is also lacking with Kobayashi.

The Examiner appears to agree that teaching or suggestion for the claimed “third set of pipes” cannot be found within Li. On page 10 of the Office Action, the Examiner admits that “Li does not disclose pipes configured to transport the process fluid from the chamber directly to the intermediate tank.” However, the Examiner suggests that “Shacham-Diamond [sic] discloses a pipe

(pipe 124) equivalent to the third pipe, which [is] configured to transport process fluid directly from the process chamber to the intermediate or holding chamber (item 148)” (Office Action, page 10). Therefore, the Examiner concludes that it would have been obvious to combine the pipe 124 of Shacham-Diamand with the electroless plating system of Li “to permit recirculation of the processing fluid.” The Applicant disagrees with the proposed combination for at least the reasons set forth below.

As shown in Fig. 3, Shacham-Diamand discloses an electroless deposition apparatus (9) including a processing chamber (112) used for processing a wafer and a holding tank (148) used for temporarily storing the processing fluid, which is to be recirculated back to the processing chamber. Shacham-Diamand teaches that the “processing fluid enters process chamber 112 through an inlet 121. Inlet 121 connects to a spray bar 114, which disperses the fluid onto the rotating semiconductor wafer 120 in a uniform flow. The fluid then exits process chamber 112 through an outlet 124” (Shacham-Diamand -- col. 6, lines 12-27; Fig. 3).

The Examiner suggests that outlet 124 of Shacham-Diamand is somehow equivalent to the presently claimed “third set of pipes.” The Applicants strongly disagree. As noted above, claim 27 requires that the third set of pipes be configured to transport the process fluid from the chamber directly to an intermediate tank, which is interposed between the chamber and a storage tank configured to hold the process fluid. Other than processing chamber 112, the holding tank (148) shown in Fig. 3 of Shacham-Diamand is the only tank configured to hold the processing fluid. If holding tank 148 can be interpreted to read upon any of the limitations recited in claim 27, it would most accurately read upon the presently claimed “storage tank.” In other words, Shacham-Diamand fails to include an “intermediate tank” interposed, e.g., between processing chamber 112 and holding tank 148. Therefore, although outlet 124 may transport process fluid from processing chamber 112 (i.e., the alleged “chamber”) to holding tank 148 (i.e., the alleged “storage tank”), outlet 124 cannot be considered equivalent to the presently claimed “third set of pipes,” because outlet 124 is not configured for transporting the process fluid from the processing chamber directly to an intermediate tank (which is clearly absent in the apparatus disclosed by Shacham-Diamand).

If the proposed combination were made, outlet 124 of Shacham-Diamand would (at best) enable process fluid to be transported from processing chamber 120 to holding tank 100 of Li. However, such recirculation of processing fluid is already provided by line 115 which, as shown in Fig. 1 of Li, transports processing fluid from processing chamber 120 to holding tank 100. Since neither Li nor Shacham-Diamand provide teaching, suggestion or motivation for recirculating the processing fluid from a processing chamber (e.g., chamber 120 of Li or chamber 112 of Shacham-Diamand) to an intermediate tank (e.g., pre-heat tank 110 of Li; no intermediate tank is disclosed by Shacham-Diamand), the teachings of the cited art cannot be combined or modified to read upon the presently claimed "third set of pipes."

For at least the reasons set forth above, Li and Kobayashi fail to provide teaching or suggestion for all limitations recited in present claim 27. In addition, the teachings of Shacham-Diamand cannot be combined with those of Li and Kobayashi to overcome the deficiencies therein.

Applicants have shown that the cited references each fail to provide teaching or suggestion for all limitations of present independent claims 13 and 27. Accordingly, Applicants believe claims 13 and 27, as well as all claims dependent therefrom, are patentably distinct over the cited references. Therefore, Applicants respectfully request removal of this rejection in its entirety.

CONCLUSION

This response constitutes a complete response to all of the issues raised in the final Office Action mailed October 19, 2006. In view of the amendments and remarks herein, Applicants assert that pending claims 13-20 and 25-32 are in condition for allowance. If the Examiner has any questions, comments, or suggestions, the undersigned earnestly requests a telephone conference.

No fees are required for filing this amendment; however, the Commissioner is authorized to charge any additional fees, which may be required, or credit any overpayment, to Daffer McDaniel LLP Deposit Account No. 50-3268/5866-00400.

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